
फेरबाम, तकनीकी — विशिष्टि

(पहला पुनरीक्षण)

Ferbam, Technical — Specification

(*First Revision*)

ICS 65.100.30

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FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Pesticides Sectional Committee had been approved by the Food and Agriculture Divisional Council.

Ferbam, technical is employed in the preparation of fungicidal formulations for use in agricultural crops.

Ferbam is the accepted common name by the International Organization for Standardization (ISO) for ferric dimethyl dithiocarbamate. The empirical, structural formulae, and molecular mass of ferbam are listed below:

<i>Empirical Formula</i>	<i>Structural Formula</i>	<i>Molecular Mass</i>
$\text{C}_9\text{H}_{18}\text{FeN}_3\text{S}_6$		416.5

This standard was first published in 1988. In this revision, the standard has been brought out in the latest style and format of the Indian Standards.

In the preparation of this standard, due consideration has been given to the provisions of the *Insecticides Act*, 1968 and the rules framed thereunder. However, this standard is subject to the restrictions imposed under these, wherever applicable.

The composition of the committee responsible for the formulation of this standard is listed in Annex B.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 ‘Rules for rounding off numerical values (*second revision*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Indian Standard***FERBAM, TECHNICAL — SPECIFICATION***(First Revision)***1 SCOPE**

This standard prescribes the requirements and the methods of sampling and test for ferbam, technical.

2 REFERENCES

The standards, listed below contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards.

<i>IS No.</i>	<i>Title</i>
IS 1070 : 1992	Reagent grade water — Specification (<i>third revision</i>)
IS 3900 : 1975	Specification for ziram, technical (<i>first revision</i>)

*IS No.**Title*

IS 6940 : 1982	Methods of test for pesticides and their formulations (<i>first revision</i>)
IS 8190 (Part 1) : 1988	Requirements for packing of pesticides: Part 1 Solid pesticides (<i>second revision</i>)
IS 10946 : 1996	Methods of sampling for technical grade pesticides

3 REQUIREMENTS**3.1 Description**

The material shall be in the form of homogeneous greyish black powder with no marked odour. It shall be free from extraneous matter.

3.2 The material shall comply with the requirements specified in Table 1.

Table 1 Requirements for Ferbam, Technical
(Clauses 3.2 and 7.1)

Sl No.	Characteristic	Requirement	Method of Test, Refer to
(1)	(2)	(3)	(4)
i)	Ferbam content, percent by mass, <i>Min</i>	81.0	Annex A
ii)	Moisture content percent by mass, <i>Max</i>	1.0	IS 6940

4 PACKING

The material shall be packed in clean and dry containers. The containers shall comply with the requirements as stipulated in IS 8190 (Part 1).

- h) Cautionary notice as worded in the *Insecticides Act*, 1968, and rules framed thereunder; and
- j) Any other information required under the *Legal Metrology (Packaged Commodities) Rules*, 2011.

5 MARKING

5.1 The containers shall be securely closed and shall be bear legibly and indelibly the following information:

- Name of the material;
- Name and address of the manufacturer;
- Batch number;
- Date of manufacture;
- Date of expiry;
- Net quantity;
- Nominal ferbam content, percent (*m/m*);

5.2 BIS Certification Marking

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the products may be marked with the Standard Mark.

6 SAMPLING

Representative samples of the material shall be drawn as prescribed in IS 10946.

7 TEST

7.1 Tests shall be carried out by the methods referred to in col 4 of Table 1.

7.2 Quality of Reagents

Unless specified otherwise, pure chemicals and

distilled water (*see* IS 1070) shall be employed in tests.

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the results of analysis.

ANNEX A

[Table 1, Sl. No. (i)]

DETERMINATION OF ACTIVE INGREDIENT

A-1 GENERAL

Either of the two methods, namely, the carbon disulphide method (*see A-2*) and the amine method (*see A-3*) may be used for determination of ferric dimethyl dithiocarbamate content. However, the carbon disulphide method shall be the referee method in case of dispute.

A-2 CARBON DISULPHIDE METHOD

A-2.1 Principle

Ferbam on digestion with dilute mineral acid undergoes decomposition and liberates carbon disulphide. This on reaction with methanolic potassium hydroxide forms potassium methyl xanthogenate which is estimated by titration with standard iodine.

A-2.2 Reagents

A-2.2.1 Lead Acetate Solution — 10 percent (m/v).

A-2.2.2 Sulphuric Acid — 1.1 N.

A-2.2.3 Methanolic Potassium Hydroxide Solution — 2 N, prepared by dissolving 112 g of pure potassium hydroxide in one litre of anhydrous methanol.

A-2.2.4 Dilute Acetic Acid — 30 percent (v/v).

A-2.2.5 Standard Iodine Solution — 0.1 N.

A-2.2.6 Starch Indicator Solution — freshly prepared.

A-2.2.7 Phenolphthalein Indicator Solution — 1 percent (m/v) in 96 percent ethyl alcohol.

A-2.3 Apparatus

The apparatus shall be as shown in Fig. 1 and shall consist of a 200 ml flask fitted with a condenser with

an outlet tube connected to two absorbers and a 500 ml filter flask serving as a bubbler. The latter in turn is connected to a water suction pump. An alternative assembly as illustrated in Fig. 2 of IS 3900 can also be used.

A-2.4 Procedure

Weigh accurately about 0.3 g of the material and transfer it into the 200-ml reaction flask and connect it to two absorbers, the first containing lead acetate solution (25 ml) dipped in hot water to precipitate sulphides while the other a solution of potassium hydroxide in methanol (25 ml). The temperature of the second absorber shall be maintained below 15 °C by immersing the absorber in a water-bath throughout the test. Apply suction to the system and adjust the bubbling rate to 3 to 4 bubbles per second in the bubbler containing distilled water. Add 50 ml of hot sulphuric acid through an inlet tube and reflux under suction for 1 hour and 45 minutes. Discontinue heating and transfer quantitatively the contents of the potassium hydroxide absorber into a 500 ml iodine flask, washing with distilled water, taking care not to use more than 100 ml of the same. Cool the flask and neutralize with 30 percent acetic acid solution using phenolphthalein solution as the indicator. Add starch indicator solution and titrate immediately against 0.1 N standard iodine solution till the colour changes to faint blue.

A-2.5 Calculation

$$\text{Ferbam content, percent by mass} = \frac{V \times N \times 13.87}{M}$$

where

V = volume in ml, of standard iodine solution used;

N = normality of standard iodine solution; and

M = mass in g, of the material taken for test

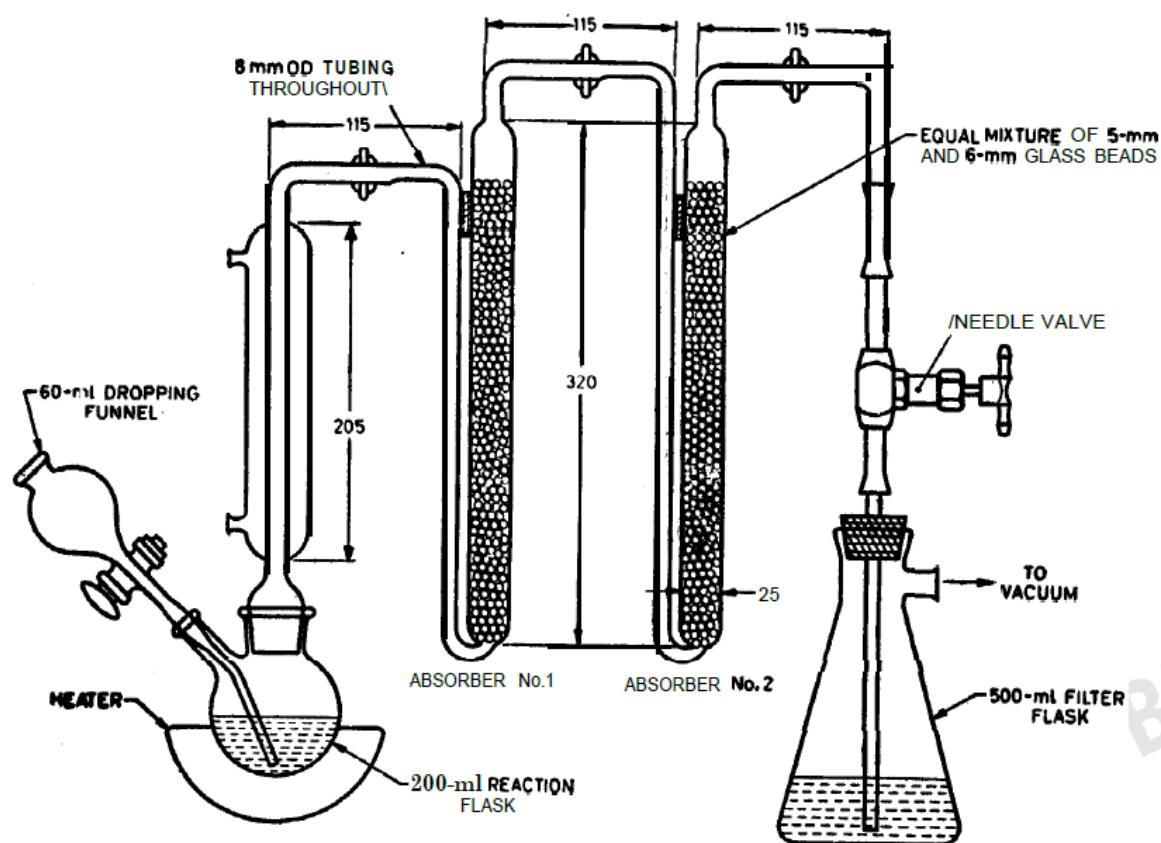


Fig. 1 ASSEMBLY OF APPARATUS FOR THE DETERMINATION OF FERBAM CONTENT

A-3 AMINE METHOD

A-3.1 Principle

Ferbam on hydrolysis with mineral acid decomposes to carbon disulphide, dimethylamine and iron salt. After boiling off carbon disulphide, the mixture is distilled under alkaline condition to liberate dimethylamine which is estimated by titration with a standard acid.

A-3.2 Reagents

A-3.2.1 Standard Hydrochloric Acid Solution — 0.2 N.

A-3.2.2 Boric Acid Solution — 20 g per litre of water containing 10 ml of 0.05 percent methyl red and 0.7 ml of 0.35 percent methylene blue solutions.

A-3.2.3 Sulphuric-Acid — approximately 5 M.

A-3.2.4 Sodium Hydroxide Solution — approximately 7.5 M.

A-3.2.5 Methyl Red Indicator Solution — 0.05 percent.

A-3.3 Apparatus

A-3.3.1 For Hydrolysis — a 150 ml round bottom flask and a reflux condenser.

A-3.3.2 For Distillation — a 1 litre round bottom flask fitted with a dropping funnel and a splash head which is connected to an upright bulb condenser fitted at its outlet with a rubber tube which dips inside a 500 ml conical flask.

A-3.4 Procedure

Weigh accurately 0.5 g to 0.8 g of the material into 150 ml round bottom flask and add to it, 50 ml of sulphuric acid. Attach a water-cooled reflux condenser to the flask and heat the contents slowly with occasional shaking to reflux. Allow to reflux for 1 hour, cool and transfer the contents quantitatively to the distillation flask keeping the total volume around 500 ml. Distil until 200 ml of distillate is collected. Discard this distillate which contains water along with some amount of carbon disulphide and cool the distillation flask to room temperature. Place 50 ml of boric acid solution in the distillate receiver (the rubber tube fitted to the outlet of the bulb condenser should dip just inside the

boric acid solution). Add a few drops of methyl red indicator followed by sodium hydroxide solution through the dropping funnel so as to neutralize the contents of the distillation flask. Add 10 ml to 15 ml of sodium hydroxide in excess and

100 ml of distilled water and distil the liberated amine, collect about 250 ml of the distillate in the receiver and titrate with standard hydrochloric acid solution to violet end point. Carry out a blank test on the reagents.

A-3.5 Calculation

$$\text{Ferbam content, percent by mass} = \frac{(t_1 - t_2) \times N \times 13.88}{M}$$

where

t_1 = titre, in ml, of standard hydrochloric acid solution required for the sample;

t_2 = titre, in ml, of standard hydrochloric acid solution required for the blank;

N = normality of standard hydrochloric acid solution; and

M = mass in g, of the material taken for test.

ANNEX B
(Foreword)

COMMITTEE COMPOSITION
Pesticides Sectional Committee, FAD 01

<i>Organization</i>	<i>Representative(s)</i>
Directorate of Plant Protection Quarantine and Storage, Faridabad	DR RAVI PRAKASH (Chairperson)
All India Biotech Association, New Delhi	SHRI SAURABH SINGHAL SHRI SHAH JI DHAR (<i>Alternate</i>)
Central Insecticide Board and Registration Committee, Faridabad	SECRETARY DR VANDANA SETH (<i>Alternate</i>)
Central Insecticide Laboratory, Faridabad	DR ARCHANA SINHA SHRI SUBHASH CHAUDHARY (<i>Alternate</i>)
Consumer Guidance Society of India, Mumbai	SHRI SITARAM DIXIT DR M. S. KAMATH (<i>Alternate</i>)
Crop Care Federation of India, New Delhi	DR J. C. MAJUMDAR
Crop Life India, New Delhi	SHRI ASITAVA SEN MS NIRUPAMA SHARMA (<i>Alternate</i>)
CSIR-Indian Institute of Toxicology Research, Lucknow	DIRECTOR DR SHEELENDRA P. SINGH
FMC India Private Limited, Bengaluru	SHRI CHIRAG PATEL
Food Safety and Standards Authority of India, New Delhi	ADVISOR (STANDARDS)
IDMA Laboratories Limited, Chandigarh	DR INDRA RAI
Indian Agricultural Research Institute, New Delhi	DIRECTOR
Indian Institute of Packaging, Mumbai	DR TANWEER ALAM
Indian Pest Control Association, New Delhi	SHRI UDAYAN GHOSH
Institute of Pesticide Formulation Technology, Gurgaon	DR M. VAIRAMANI
Ministry of Agriculture, Department of Agriculture, Chennai	JOINT DIRECTOR OF AGRICULTURE (<i>RES.</i>) DEPUTY DIRECTOR LAB (<i>Alternate</i>)
National Centre for Integrated Pest Management, New Delhi	DR SUMITRA ARORA
National Institute of Plant Health Management, Hyderabad	DR MAHESH SAINI MS T. SRIDEVI (<i>Alternate</i>)
Pesticide Manufacturers and Formulators Association of India (PMFAI), Mumbai	DR ARCHANA SRIVASTAVA DR UDAY KUMAR (<i>Alternate</i>)
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BIS Directorate General

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'E'/DIRECTOR AND HEAD (FOOD AND
AGRICULTURE) [REPRESENTING DIRECTOR
GENERAL (*Ex- Officio*)]

Member Secretary

SHRI KULDEEP MITTAL
SCIENTIST 'B'/ASSISTANT DIRECTOR
(FOOD AND AGRICULTURE), BIS

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Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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